CITY OF RIVERSIDE

PUBLIC UTILITIES DEPARTMENT

RIVERSIDE, CALIFORNIA

SPECIFICATION NO. 2-6

for

STREET LIGHT CONSTRUCTION

By

PUBLIC UTILITIES DEPARTMENT
ELECTRIC DIVISION
RIVERSIDE, CALIFORNIA

Approved by T & D Committee
February 1999

Revised By:_____

Approved By:_____
Principle Electric Engineer Date

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PART 1 - GENERAL PROVISIONS

1-1 DEFINITIONS

Engineer - Electric Engineering Manager of the City of Riverside, Public Utilities Dept., Electric Division or designated representative.

Luminaire - The lamp housing including the optical, socket, and ballast assemblies.

Street light - Street light assembly complete, including foundation, standards, luminaire arm, luminaire, etc.

Streetlight standard - The shaft or pole used to support the luminaire arm, luminaire, etc.

1-2 GENERAL

1-2.1 PLANS. All incidental parts which are neither shown on the plans nor otherwise specified, and which are necessary to complete the street lighting system, or are required for modifying existing systems, shall be furnished and installed as though such parts were shown on the plans or specified. All systems shall be complete and shall operate satisfactorily at the time of acceptance of the work.

The streetlights and appurtenances shall be located as shown on the plans. Any deviation must be approved by the Engineer.

1-2.2 REGULATIONS AND CODES. All electrical equipment shall conform to the standards of the National Electrical Manufacturers Association (NEMA). In addition to the requirements of the plans and specifications, all materials shall conform where applicable to the requirements of the National Electrical Code, hereinafter referred to as the Code; California Code of Regulations, Title 8, Subchapter 5, Electrical Safety Orders; Rules for Overhead Electrical Line Construction, General Order No. 95 and Rules for Construction of Underground Electric Supply & Communication systems, General Order No. 128 of the California Public Utilities Commission; Standards of the American Society for Testing and Materials (ASTM); American National Standards Institute (ANSI); the Insulated Cable Engineers Association (ICEA) and the Standard Specifications for Public Works Construction.

1-2.3 EQUIPMENT LIST AND DRAWINGS. The Contractor shall submit to the Engineer for approval a list of equipment and material which the Contractor proposes to install. This list shall be complete as to the name of the manufacturer, size and catalog number of unit; and shall be supplemented by such other data as may be required, including detailed scale drawings, any non-standard special equipment, and shall show any proposed deviation from the plans. The Contractor shall submit for approval, when requested, sample articles of any materials proposed for use. All such

data shall be submitted in duplicate for checking. After checking, correction, and approval, not less than three complete sets shall be submitted to the Engineer. The Contractor shall be responsible for any material purchased, labor performed, or delay to the work prior to such approval.

Upon completion of the work, the Contractor shall submit a plan showing all construction changes.

The Contractor shall also furnish all literature and drawings which are received for the type of equipment to be installed, and which pertain to the engineering, installation, operation and maintenance of that equipment.

1-3 RESPONSIBILITIES OF THE CONTRACTOR IN THE CONDUCT OF THE WORK

1-3.1 PERMITS AND LICENSES. The Contractor shall obtain all permits and licenses necessitated by Contractor's operations, and give all notices necessary and incident to the due and lawful prosecution of the work and to the preservation of the public health and safety.

Prior to starting any work, the Contractor shall be required to be licensed in accordance with the provisions of Chapter 9 of Division 3 of the Business and Professions Code, and the Rules and Procedures of the California Contractors' State License Board and in good standing with the Board. Proof of such license shall be provided as required by Business and Professions Code § 7031.5. The Contractor must also have a current City of Riverside Business License and shall obtain a street opening permit from the City of Riverside, Public Works Department.

1-3.2 CLEANUP AND DUST CONTROL. Throughout all phases of construction and until completion of work, the Contractor shall keep the work site clean and free from rubbish and debris. The Contractor shall also abate dust nuisance by cleaning, sweeping and sprinkling with water, or other means as necessary. The use of water resulting in mud on public streets will not be permitted as a substitute for sweeping or other methods. Materials and equipment shall be removed from the site as soon as they are no longer necessary. Upon completion of the work and before final inspection the entire work site shall be cleared of equipment, unused materials and rubbish so as to present a satisfactory clean and neat appearance.

Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately and the area cleaned.

Failure of the Contractor to comply with the Engineer's cleanup orders may result in an order to suspend work until the condition is corrected.

1-3.3 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS. The Contractor shall be responsible for the protection of public and private property adjacent to the Work and shall exercise due caution to avoid damage to such property.

The Contractor shall repair, replace or relocate all existing improvements within the right-of-way which are not designated for removal (e.g., curbs, sidewalks, driveways, fences, walls, signs, utility

installation, pavements, structures, sprinkler system, etc.) which are damaged or removed as a result of Contractor's operations. Repairs and replacements shall be at least equal to existing improvements, and shall match them in finish and dimension.

Trees, lawns, and shrubbery that are not to be removed shall be protected from damage or injury. If damaged or removed because of the Contractor's operations, they shall be restored or replaced in as nearly the original condition and location as is reasonably possible. Lawns shall be re-sodded.

1-3.4 TRAFFIC. The Contractor shall comply with all regulations and requirements of the City of Riverside, Public Works Department, Traffic Division.

Access to business and residences will be maintained at all times. The temporary closure of existing accesses will be coordinated with all affected businesses not less than 48 hours prior to closure.

PART 2 - CONSTRUCTION MATERIALS

2-1 STREET LIGHTS. Size and type of standards, luminaire arms, luminaires, lamps, photo controls and foundations shall be as shown on the plans. Prestressed concrete poles shall conform to City of Riverside Public Utilities Department, Standard Specification No. 195.

2-2 ANCHOR BOLTS. Anchor bolts shall be of the type and size as shown on the plans. Anchor bolts shall conform to the specifications of ASTM A-307 and shall be provided with two nuts and two washers each.

Anchor bolts, nuts and washers shall be galvanized by the hot-dip process conforming to ASTM A-153.

All nuts shall be symmetrically formed with the hole centered and at right angles to the face, tapped to fit a corresponding thread so that the nut can be run the entire length of the thread by the fingers without undue forcing, and without noticeable play or rocking.

2-3 CONDUIT. Size and type of conduit shall be as shown on the plans. It shall be the option of the Contractor to use larger conduit than that specified, provided that where such substitution is made, it shall be for the entire length of the conduit run. Reducing fittings are not permitted.

Maximum bend in a conduit shall be 90 degrees. Minimum radius of a factory bend shall be 6 inches. Where under special conditions, factory bends are not used, conduit shall be bent, without crimping or flattening, to a radius of not less than 20 times the outside diameter of the conduit.

The ends of conduit shall be reamed to remove burred or rough edges. All threads shall be treated with lead plate before fittings are placed thereon. Where the galvanized coating of conduit or fittings has been damaged in handling or installing, such damaged areas shall be thoroughly painted with a rust preventive paint.

Ends of conduit shall be properly coupled. Running threads, threadless connectors or threadless couplings will not be permitted on steel conduit.

Galvanized conduit fittings shall be galvanized by the hot-dip electrodepositing, or metallizing process in accordance with Subsection 210-3 of the Standard Specifications for Public Works Construction. Galvanized conduit shall conform to standards for rigid steel conduit as specified by Underwriters Laboratories, Inc., and shall bear the Underwriters' label on each length.

Semi-rigid plastic conduit when specified on the plans shall conform to City of Riverside, Public Utilities Department, Standard Specification No. 152.

2-4 WIRE. Size and type of wire shall be as shown on the plans. Copper wire conductors shall conform to the applicable portions of ASTM B-3 and B-8. Aluminum wire conductors shall conform to the applicable portions of ASTM B-230, B-231, B-262 and B323.

Wire for multiple street lighting systems shall be rated for 600 volt operation and shall have either 75°C, THW, 4/64 inch, black polyvinyl chloride insulation or 75°C, XHHW, 3/64 inch, black cross linked polyethylene insulation conforming to I.C.E.A. & NEMA Standards.

2-5 PULLBOXES. Size and type of pullboxes shall be as shown on the plans. Pullbox covers shall be inscribed "TRAFFIC SIGNALS" for traffic signal systems or combined traffic signal and street light systems less than 600 volts, and "STREET LIGHTING' for street light systems less than 600 volts.

PART 3 - CONSTRUCTION METHODS

3-1 EXCAVATION AND BACKFILL. The excavations required for the installation of conduit, foundations and other equipment shall be performed in such a manner as to cause the least possible damage to the streets, sidewalks and other improvements. The trenches shall not be excavated wider than necessary for the proper installation of the electrical equipment or foundations. Excavating shall not be performed until immediately before installation of equipment. Excavation shall not be left unfilled for a period exceeding two weeks. The material from the excavation shall be placed in a location to cause the least obstruction to surface drainage and vehicular and pedestrian traffic and shall not be left in the street.

Where pilot holes and jacking pits are excavated in parkways and lawns, the sod shall be removed and preserved by the Contractor. Upon backfilling and puddling, the sod shall be replaced, well tamped, and restored to original grade. Soil around the foundation cap shall be sloped a maximum 2:1 to match the grades. The Contractor may be required to reseed the aforementioned areas. Any excess excavated material will be properly disposed of off the site by the Contractor.

Where pilot holes, jacking pits and foundation locations are excavated in concrete sidewalk, cuts and joints shall conform with applicable provisions of Subsection 300-1.3 of the Standard Specifications for Public Works Construction.

After backfilling, excavations shall be kept well-filled and maintained in a smooth and well-drained condition until permanent repairs are completed.

At the end of each day, and at all other times when construction operations are suspended, all equipment, material and debris shall be removed from that portion of the right-of-way open for vehicular and pedestrian traffic. Barricades shall be erected at all excavations not backfilled or finished to final grade. The excavations will be covered with plywood or other suitable material of sufficient strength to support pedestrian and any other anticipated loads.

All excavations, including those resulting from removal of existing equipment as specified on the plans, shall be backfilled and the surface restored to match existing improvements.

Unless otherwise specified or approved by the Engineer, excavation in the street or highway shall be performed in such a manner that not more than one lane of traffic is restricted in either direction at any time.

Specific approval from the City Traffic Engineer must be received before any lane of traffic is closed outside the hours of 8:30 AM to 4 PM.

3-2 FOUNDATIONS. All work shall conform to line, elevation and grade as shown on the plans or

as established by the Engineer.

The longitudinal grade for the improvement shall be the same as the grade from the top of the existing curb. If there is no curb, the longitudinal grade will be established by the Engineer.

The transverse grades shall be established as follows:

a) Existing curb and no sidewalk -- The grade shall slope upward from the top of the back face of the curb at the rate of 1/4 inch per foot.

b) Existing curb and sidewalk -- The grade shall be a straight line from the top of the back face of curb to the top of the near edge of 5-foot sidewalks, and shall join all around in full-width sidewalk or sidewalk constructed adjacent to the curb.

c) Service road parkways -- The grade shall be a straight line between the top of the back face of one curb to the top of the back face of the other curb.

d) If the lateral grade of the existing parkway exceeds a slope of plus or minus 1 inch per foot, the contractor may be required to install retaining walls and aprons as directed by the Engineer.

The foundations shall be constructed in one pour of Class 560-C-3250 *(6 sack)* conforming to applicable requirements of Section 201 of the Standard Specifications for Public Works Construction and to shape dimensions shown on the plans. The bottom of the foundations shall rest securely on firm, undisturbed soil. When a firm footing cannot be obtained at the depth shown on the plans, holes shall be dug with a post hole auger or similar tool to extend the excavation to solid footing. Such holes shall be 4 in number, at the foundation corners, and not less than 6 inches in diameter. Where sand or soft material is encountered, the holes shall be cased with pipes 6 inches in diameter. The holes and foundation excavation shall be filled with concrete in one operation.

Where foundation cannot be constructed to standard dimensions because of an obstruction, the foundation shall be installed as directed by the Engineer.

Where forms are required because of soil conditions, they shall be true to line and grade, firmly braced and secured in place, and shall remain for 72 hours.

Foundations must cure at least 72 hours before street light standards are set in place.

Ordinary surface finish shall be applied to exposed surfaces of concrete. Wherever the edge of a concrete foundation extends within 18 inches of any existing concrete improvement, a slab with a minimum thickness of 3 inches shall be extended to meet such improvement.

The foundation cap shall match the color and finish of the adjacent sidewalk.

Foundations located in parkways requiring concrete caps shall be brought to grade as shown on the plans by using a grout of 2:1 sand and cement.

3-3 CONDUIT. All conduit placed by jetting, boring, or laid in open trench shall be not less than 18 inches or more than 36 inches below top of curb. A sufficient number of inspection holes shall be made by the contractor along the line of the conduit to insure proper depth of conduit. Unless otherwise shown on the plans, the conduit shall be parallel with the curb, and shall enter the foundations parallel to the curb. Conduit shall be placed as close to the curb as practicable and not more than 24 inches behind the curb unless otherwise specified. When crossing under a roadbed, the conduit shall be placed not less than 24 inches or more than 48 inches below the flow line of the gutter or equivalent grade where no gutter exists.

Galvanized conduit shall be placed under existing pavement by approved jacking or drilling methods. Impact driving of conduit will not be permitted. Pavement shall not be disturbed without the approval of the Engineer, and then only in the event obstructions are encountered. When approved by the Engineer, small test holes may be cut in the pavement to locate obstructions. Jacking or drilling pit sites shall be subject to the approval of the Engineer. Excessive use of water which might undermine pavement, or soften subgrade, will not be permitted.

When conduit is placed, the ends of each conduit run shall be threaded and capped with standard pipe caps until the Contractor is ready to install the cable. These pipe caps shall be replaced with acceptable conduit bushings before the cable is installed.

Conduit laid in open trench shall not be covered nor shall any trench or inspection hole be backfilled until the installation has been approved by the Engineer. The exterior surface of the conduit which will be partially or completely imbedded in concrete structures shall be cleaned before concrete is placed.

Conduit ends and anchor bolts projecting from foundations shall be protected in such a manner as to prevent injury to pedestrians prior to setting of the standards.

Conduits terminating in street light standards or pull boxes shall not be transposed. Each conduit shall terminate as near the door of the standard as possible with the end of the conduit below, but within 1 inch of the height of the lower edge of the door. The last 8 inches of the conduit shall be straight and so placed that the prolongation of the 8-inch length shall pass through the door opening.

Conduits in pull boxes must be installed so that the prolongation of the conduit will pass through the top opening of the pull box. Ends of conduits shall terminate at least five inches below the bottom of the pull box cover.

Extra conduit stubs for future use shall extend no less than 6 inches from the face of the foundation in the direction shown on the plans and shall be capped with standard pipe caps on both

ends.

Prior to installation of cable, the Engineer shall require a proper size-testing mandrel to be passed through all conduit in place in Engineer's presence.

The end of any conduit terminating without a pull box at any point in back of a curb shall be identified by chipping the standard "+" at least 3 inches in height on top of the curb.

3-4 PULLBOXES. Pullboxes shall be installed with the long side parallel to and a minimum of 4 inches back of the back face of curb. The transverse grade shall be established in Section 3-2. Pull boxes shall not be installed in any part of a driveway unless otherwise specified.

A pull box extension may be required where an IL transformer or ballast is to be used.

The bottom of the pull box shall rest firmly on a 12-inch thick bed of 3/4" crushed rock extending 6 inches beyond the outside edges of the pull box.

Knockout openings, through which conduit enters pull boxes, shall be sealed with grout after conduit installation. To facilitate work, the Contractor may install at Contractor's expense any additional pullboxes not shown on the plan at locations approved by the Engineer.

3-5 STREET LIGHTS. Plumbing of street light standards shall be accomplished by adjusting the nuts on the anchor bolts before the foundation is finished to final grade. Shims, or other similar devices for plumbing or raking, will not be permitted.

3-6 CABLE

3-6.1 GENERAL. Cable shall be sufficient length to extend 3 feet beyond the outside base opening of the street light or pull box.

Each lead shall be coiled in as large a circle as possible in the base of all street lights or pull boxes.

All ends of installed conductors and cables shall be taped to exclude moisture, and shall be so kept until the connections are made.

3-6.2 INSTALLATION. To insure the safety of the cable and to protect the sheath from abuse and rough usage, the cable shall be pulled into the conduit directly from the original spool or reel, using as a lubricant high performance gel polymer solution (HPGP), or other lubricant approved by the Engineer. Cable shall be pulled into the conduit by hand, by compressed air, or by other methods approved by the Engineer. The conductor and sheath shall be so connected to the pulling wire or cable as to equalize the stress on each.

Cables shall be installed in continuous lengths between street light standards and/or pullboxes. Cable splices will not be permitted in conduits.

3-7 BONDING AND GROUNDING. All street lighting systems shall provide for electrical ground continuity.

Systems installed with metallic conduit shall have all conduit, street lights, metal cased external ballasts and all other metallic appurtenances to the system bonded to each other.

When shown on the plans systems installed with plastic conduit shall include the installation of a continuous conductor bonding together all street lights, metal cased external ballasts and all other metallic appurtenances to the system. **This bond wire will not be used as a neutral. The street light circuit shall be used for street lights only.**

Bonding conductor shall be insulated copper wire or copper strap with a minimum cross-sectional area equivalent to AWG Size No. 8. All connections shall be made using UL approved ground clamps and brass nuts and bolts. One bonding conductor in each concrete street light base shall be looped up to the level of 2 inches above the bottom of the hand hole opening **and will be identified with green tape.** Once in each block or at intervals not to exceed 500 feet along the plastic conduit run, the bonding conductor system shall be securely grounded to a driven 5/8"x8' copper or copper clad ground rod having its upper end not more than 3 inches above the conduit.

3-8 SERVICE POINTS. Service points shown on the plans for street lighting systems may be subject to change. The contractor shall obtain the exact service point and riser location from the Engineer. The contractor shall furnish and install conduit and conductors to the service point as shown on the plans. All service points on wood poles shall have rigid conduit installed to 8'-1" above grade.

Before starting work on existing street lighting circuits, the Contractor shall obtain daily safety circuit clearance from the serving utility.

The Contractor shall maintain service to all existing lamps except as directed by the Engineer.

When shown on the plans, existing systems requiring relocation shall be maintained so as to have existing lighting levels remain in operation nightly. The Contractor may elect to install temporary lighting, equal to or better than existing lighting levels, in-lieu of maintaining existing lighting systems. Temporary lighting systems shall be approved by the Engineer.

3-9 SPLICES. Conductors shall be joined by the use of a connector approved by the Engineer. The splice shall be capable of satisfactory operation under continuous submersion in water. Spliced cable will not be permitted in conduit.

Conductor insulation shall be roughened before applying splice insulation. Splice insulation shall consist of layers of thermoplastic electrical insulating tape not over 0.007 inch thick, conforming to Federal Specifications MIL-I-7798, applied to a thickness equal to and well lapped over the original insulation.

A cast insulation of self-curing epoxy resin of a make approved by the Engineer, which is compatible with the wire insulation to form a moisture resistant joint may be used. The resin shall be resistant to weather and aromatic and straight chain solvents and, in addition, shall not sustain combustion. The resin shall be poured into molds of dimensions suitable for the splice, and in one continuous pour.

3-10 INSPECTIONS. All work and materials are subject to inspection and approval of the Engineer during all phases of construction. The Contractor shall notify the Engineer before noon of the working day before inspection is required. The Contractor shall be solely responsible for notifying the Engineer where and when such work is in readiness for inspection. Should such work be covered without inspection and approval, it shall be uncovered, inspected, approved and redone at the Contractor's expense.

All materials shall be new and unused, unless specified otherwise on the plans, and shall be subject to inspection after delivery to the job site and during installation. Failure of the Engineer to note faulty materials or workmanship during construction shall not relieve the Contractor of the responsibility for removing or replacing any such material at Contractor's expense.

When required by the Engineer, inspection or sampling of certain materials may be made at the factory or warehouse prior to delivery to the job site.

Materials which have been rejected prior to delivery shall not be delivered to the job site and all material which has been rejected at the job site shall be removed from the site immediately.

Prior to completion of the work, the Contractor shall cause the following tests to be made in the presence of the Engineer on all lighting circuits:

a) Tests for continuity of each circuit.

b) Tests for ground in each circuit.

c) A megger test on each circuit between the circuit and the ground.

d) A functional test in which it is demonstrated that each and every part of the system functions as specified or intended herein.

e) All lighting equipment shall be energized under as near actual service conditions as possible for three successive nights. During the third night of the test, all circuits shall be patrolled at least once by the Contractor and any inoperative equipment replaced.

Any fault in any material or in any part of the installation revealed by these tests shall be corrected by the Contractor in a manner approved by the Engineer and the same tests shall be

completed again.

3-11 REMOVAL, ABANDONMENT, AND SALVAGE. The Contractor shall not remove or de-energize any existing street light systems without authorization of the Engineer.

REMOVAL. Street light facilities shown on the plans to be removed shall become the property of the Contractor and shall be removed from the job site, and any salvage value shall be reflected in the Bid.

ABANDONMENT. Street light facilities shown on the plans to be abandoned shall be left in place by the Contractor. Foundations to be abandoned in place shall have the top of the foundation, anchor bolts and conduits removed to a depth of 6" below finished grade and the resulting hole backfilled with materials equivalent to the surrounding or proposed surrounding materials.

SALVAGE. Street light facilities shown on the plans to be salvaged shall be removed and delivered by the Contractor to the City yard at 8095 Lincoln Ave. All salvaged facilities shall remain the property of the City.

The Contractor shall exercise care in removing facilities to be re-used or salvaged so that they will remain in the condition existing prior to their removal. The Contractor will be required to replace, at Contractor's expense, any facilities damaged during removal when such equipment is designated for re-use or salvage.

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